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been effected, chiefly, by cutting out about 30 pages on special organology, and 60 pages on "Architektonik" or morphology; also by omitting many figures and parts of the descriptive matter, as well as changing other parts. Some new paragraphs, mostly of a historical nature, have been inserted.

The second part of the book or "special part" deals with the descriptive histology of some 40 animal types taken in almost systematic order. The entire histology of each form is seldom discussed, but only such portions as are characteristic, or as fill out gaps in the rather rough and incomplete system of tissue classification, are described in the author's thorough and scholarly way. The whole part is divided, very arbitrarily, into 50 lessons as a convenience to teaching.

This special part is, of course, the largest and most substantial part of the book. To estimate very crudely the amount by which it has been reduced from the corresponding part in the old edition, it may be said that in the latter it occupied 685 pages, while in the new form it is contained in 445 pages. This reduction has been secured by taking out descriptions of a few entire forms and of certain of the tissues of other forms. Care has been shown in doing this, as a rule, to remove those parts which in any sense duplicated or paralleled other parts.

Comparatively little has been added to this part of the book, although it has been carefully worked over and much changed in many details. One improvement consists of the addition in several places of appropriate details of histogenesis. The omission of any allusion to the comparatively rare but important tissues that produce light and electricity is a disappointment to the reviewer; the more so that other rare tissues of possibly less fundamental importance have been left in, as a quite extensive account of the structure and development of the nettle cells of *Physophora*. All reference to gas secretion has been omitted, although it was treated of in the first edition and is a matter of scientific importance.

The index is short, too short even when one considers that the method of arrangement and table of contents both supply much that is

omitted in its numbers. As an instance, a student or research man would have to search through nine pages of text to find the concise but valuable account of muscle structure in *Peripatus* (pp. 131-132), there being no indication of this item in index or table of contents. Were he to start on a comparative study of muscle he would have to search carefully in other places as well. This also holds true for other tissues.

Personally the writer would have preferred to see an enlarged edition of the former "Lehrbuch," strengthened by certain additions and revisions. One can not help feeling that the new edition is, in part, a sacrifice of scientific ideals to practical or even commercial demands. An advanced student should really have the old edition as well as the new, even if he should not prefer the first edition outright. It is to be hoped that the author will, in the near future, give to advanced students of scientific histology a third and fuller edition.

The printing, figures and general make-up are all that can be desired, and the very few errors of typography and lettering are a negligible quantity; the bibliography is full and complete. The book should be in the hands of every advanced student of histology as well as of other zoological subjects.

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Probleme der Protistenkunde. I. Die Trypanosomen ihre Bedeutung für Zoologie, Medizin und Kolonialwirtschaft. Von F. DOFLEIN, Ao. Professor der Zoologie an der Universität München. Jena, Gustav Fischer. 1909. Pp. 1-57.

Under the above title there has appeared an excellent article on the present knowledge concerning trypanosomes.

The trypanosomes are small one-celled animals bearing a flagellum on one end and an undulating membrane on the side of the body. They are classed under the protozoan group Flagellata. They are parasitic in the blood of vertebrates and cause in mammals serious diseases, such as "nagana," "surra," "dourine" in horses and "sleeping sickness" in man. The pathogenic forms are distributed

principally in South America, Asia and Africa.

Although the parasite has been known for more than half a century, very little importance was attached to it until within the last decade. As knowledge of these forms has recently advanced, so have they become very important, not only to the physician on account of their rôle in the etiology of disease, but also to the zoologist who is desirous of knowing their finer structure, their life history and their genetic affinities.

One of the important phases of the article is a discussion of the method of transmission of the parasite. Doffein points out that there are three probable modes of transmission.

The first mode is by means of cysts or spores. In such cases it would be necessary for the parasites to wander through the walls of the blood-vessels out upon the skin or mucous membrane and there form cysts. They must then be taken up with dust, water or food by an intermediate host and be carried to the vertebrate host. At present no facts are known to support this theory, except that certain authors have described stages in the blood and internal organs, which they interpreted as cysts. But these are probably nothing more than degeneration stages.

The second method is through coitus, as is the case with *Spirochæta* and the trypanosome causing dourine. Doffein is of the opinion that this mode of transmission may be possible in all trypanosomes, and hence regards it as an important point to be investigated.

The third method is the passive transmission through the agency of blood-sucking invertebrates. Experiments show that insects are capable of passively carrying the trypanosomes from an infected to a sound patient. Since the work of Schaudinn (1904) on the transformations of the owl trypanosome in the stomach of the mosquito, investigators have thought that the trypanosome must pass through a complicated life-cycle in an invertebrate host. Setting out with Schaudinn's work before them, they have tried to fit their discoveries to his interpretations. They have searched for male and female forms, believing

that there must be a life-cycle similar to malarial forms in the mosquito. But no one has ever yet seen male and female, if they exist, in process of conjugation, and so the insect is known only to be a passive carrier of the infection.

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The Study of Nature. By SAMUEL CHRISTIAN SCHMUCKER. Pp. 315, illustrated. Philadelphia, J. B. Lippincott and Co. 1908. \$1.25.

This latest addition to the long list of books designed to guide teachers of nature study will, like many of its rivals, give much help; but still leaves the most pressing problems of elementary school nature study just where they were before its publication. This fact is mentioned not in criticism, but simply to forewarn those who eagerly expect each new book on nature study to make some decided advance towards complete establishment and successful teaching of the subject in all our elementary schools. For such a golden age of nature study we have as yet at most only a prophetic vision.

In the first chapters dealing with the principles of nature study the author follows the most advanced stage of the nature study movement when he urges as essential the observational study of natural things, as far as possible, in their natural relations and chosen for their commonness and abundance rather than for their rarity.

In the chapter on *The Real Purpose of Nature Study* the author agrees with many other writers in urging nature study as for many individuals a valuable addition to the general culture which is valuable for avocation rather than for the main business of life. Also he believes in practise in accurate observing and stating results as decidedly effective in establishing firm character, and in nature study as a guide to a religious attitude towards nature. All this agrees with the experience of many naturalists, but the doubting educators who have had no experience in scientific study will continue to regard these purposes as vague and not convincing. The